GAU 3721

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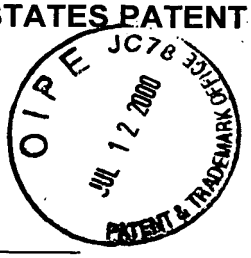

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Title: METHOD AND APPARATUS FOR MANUFACTURING MARKED ARTICLES TO BE INCLUDED IN CANS

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Sir:

Please accept the enclosed certified copy(ies) of the respective foreign application(s) listed below for which benefit under 35 U.S.C. 119/365 has been previously claimed in the subject application and if not is hereby claimed.

Application No.	Country of Origin	Filed
9801489-7	Sweden	28 April 1998

Respectfully submitted,

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PRV

PATENT- OCH REGISTRERINGSVERKET
Patentavdelningen

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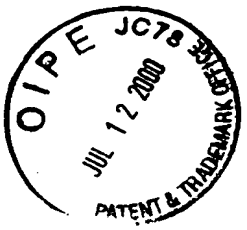
Certificate

Härmed intygas att bifogade kopior överensstämmer med de handlingar som ursprungligen ingivits till Patent- och registreringsverket i nedannämnda ansökan.

This is to certify that the annexed is a true copy of the documents as originally filed with the Patent- and Registration Office in connection with the following patent application.



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AWAPATENT

METHOD AND APPARATUS FOR MANUFACTURING MARKED OPENING TABS FOR CAN LIDS

Technical Field

The present invention generally concerns the technique of manufacturing opening tabs to be attached to lids for cans, in particular beverage cans.

Background Art

In a brochure entitled "This is PLM Fosie" issued by Applicant's Swedish company PLM Fosie AB in the mid nineties, there is shown on p. 6 how can lids are produced.

In a first production stage, a thin metal strip, preferably a 0.23-mm-thick aluminium strip, is fed to a tab forming unit in which the strip is punched and stamped to form opening tabs integrated with the strip. The tabs are also referred to as opener rings by persons skilled in the art.

In a second production stage, circular shells for forming the can lids are die cut from a thin metal sheet, preferably a 0.23-mm-thick aluminium sheet. Each shell is scored for opening, and a rivet for attachment of the tab is formed at the centre of the shell.

In a third production stage, the strip with the integrated tabs are joined with the circular shells in an attachment station, in which the tabs are separated from the strip and attached to the shells by riveting. A finished can lid is achieved when the tab is fastened to the shell. Such lids are also referred to as ends by persons skilled in the art.

This manufacture of can lids or ends is conventional and well known to the skilled person. It should be mentioned that the whole process is automated with a capacity of about 2,000 ends per line per minute. In the beverage can industry, the production rate in general is very high and it is a continuous aim to decrease the production costs and the material used for can production,

including the lids. Maintenance, tool changes and other downtime should be avoided to keep costs low.

As in other areas of the food and beverage industry, the traceability of the manufacturing and filling of the can is important. Today, there are so-called traceability marks or markings on the cans indicating when the filling took place and also when the main can body was manufactured. Normally, however, there is no traceability marking indicating when the finished can ends were produced. Such markings are often required for reasons of quality. For instance, the peripheral edge of the shell must be precisely formed to ensure a completely tight seam against the upper flange of the can. There are also several functional requirements placed on the tab and on the attachment of the same to the shell.

Thus, there is a need for indicative markings on the tabs and the shells as well as on the can body. The task of providing markings on the tab is especially difficult, resulting in a demand for an improved technique for solving this problem.

Various attempts to provide markings of this type have been made in the past. Indeed one has been successful when it comes to provide markings on the shell, since the shell surfaces available for markings are rather large. When it comes to provide markings on the tab, one has not been completely successful due to the small tab surfaces available and the high requirements of elevated production rate. For material saving reasons, the modern opening tabs are quite small, inevitably leaving only very limited tab surfaces for markings at high speed. Normally, markings of this type are provided in a stamping operation or the like.

Except for the purpose of indicating the origin of the tabs, the marks on the same may also be used in other contexts. In a commercial aspect, marks on the bottom surface of the tab may indicate the winner in a lottery or the like. The quality requirements on such "promo-

tional" marks are normally the same as in the cases where the origin is indicated.

It is known to use laser for providing identification markings on metal sheets, see for instance US-A-4,304,981. In this case, however, the markings are used for indicating defects in the manufacture of the metal strips. Thus, the requirements on the markings per se or their positioning are not crucial.

Summary of the Invention

An object of the present invention is to eliminate the drawbacks mentioned above and to provide an improved technique for manufacturing opening tabs for can lids, which tabs have distinct and indicative marks.

A specific object is that the improved technique for providing tab marks permits high production rates.

These and other objects, which will appear from the following description, have now been achieved by a method, an apparatus, an opening tab, a can lid and use as defined in the appended independent claims. Preferred embodiments of the invention are set forth in the sub-claims.

The invention brings out several advantages. An enhanced technique of providing distinct markings on the tab is accomplished. The new technique is suitable for high production rates required in modern beverage can manufacturing. Further, since a standard tab is used, there is no need for tool change in the production line when no laser engravings are desired. The same production line can be used in both cases, since the laser unit in the preferred embodiment is easily disconnectible.

Brief Description of the Drawings

In the following, presently preferred embodiments of the invention will be described, reference being made to the accompanying schematic drawings.

Fig. 1 illustrates the principles of a known method of manufacturing can lids having opening tabs.

Fig. 2 is a side view of an apparatus according to a preferred embodiment of the invention.

Fig. 3 is a top view of an opening tab according to a preferred embodiment.

Fig. 4 is a bottom view of a tab having markings on its bottom surface.

Fig. 5 is a top view of a can lid with a tab provided with the markings.

Fig. 6 is a plan view of a portion of a metal strip used for producing tabs in accordance with the invention.

Description of Preferred Embodiments

In Fig. 1, a thin metal strip 1 is shown which preferably is an aluminium strip having a thickness of about 0.23 mm. The strip 1 is put through various punching and stamping operations in a first production stage in order to form opening rings or tabs 2 integrated with the strip 1.

In another production stage, die-cut metal shells 3, preferably of aluminium sheet having a thickness of about 0.23 mm, are put through various operations for forming a can end or lid 4 which in a final production stage is provided with a tab 2 which is riveted on the top of the shell 3.

As shown in Figs 3 and 4, each tab 2 has an opening 5 and a rivet portion 6. In the tab forming operations, the peripheral edge portions 2a, 2b, 2c are bent inwardly in a manner known per se, as shown in Fig. 4. The purpose of this bending is to increase the stiffness of the tab 2. Further, the tab 2 has a stiffening recess 7 on either side of the opening 5, see Fig. 3.

The finished can lid 4 provided with a tab 2 riveted on the top surface of the shell 3 is shown in Fig. 5.

Fig. 2 shows an apparatus for the manufacture of opening tabs 2 corresponding to the working of the strip shown in Fig. 1. An aluminium strip 1 of the type described is fed from a supply 8 to a laser unit 9 supported by a supporting member 10, and finally fed to a tab

forming unit 11 which is of a type known per se. The strip 1 is guided by guiding plates 12 and 13 on either side of the supporting member 10. The feeding rate of the strip 1 and the operation of the laser 9 are controlled by a computerised control unit 14 connected to means (not shown) for feeding the strip 1 and means (not shown) for operating the laser unit 9. The laser unit 9, the operation of which will be discussed below, is thus arranged between the strip supply 8 and the tab forming unit 11. It should be pointed out that the laser unit 9 may be installed in a standard production line for tabs 2. The operation of the laser unit 9 may be disconnected, in which case the tab forming line is used in a conventional manner.

The purpose of the laser unit 9 is to provide indicative, laser engraved markings on at least one of the upper and lower surfaces of the strip 1 depending on the condition if markings are desired on the top surface or on the bottom surface of the tab 2, or on both these surfaces. The tab 2 shown in Fig. 3 has laser engraved marks A2, CC, 56 on its top surface, whereas the tab 2 in Fig. 4 has laser engraved marks WIN, A, 98 on its bottom surface.

The top markings A2, CC, 56 on the tab 2 shown in Fig. 3 serve as traceability marks indicating when the tab 2 was manufactured. These marks are codified in accordance with a specific system, where A2 is a week code (A-Z = week 1-26, a-z = week 27-52), CC is an hour code (A-X = hour 1-24) and 56 is a minute code (1-60). By this code system, it is exactly indicated when the tab 2 was produced.

The bottom markings WIN, A, 98 on the tab 2 shown in Fig. 4 serve as indications of a lottery, where the mark WIN indicates that the person who opens the can by means of the tab 2 is a winner. The other marks on the tab A, 98 constitute an identification of the lottery in question.

AWAPATENT

In Fig. 5, the tab 2 shown in Fig. 3 is attached to the top of the shell 3. Thus, the lid 4 is finished and the tab 2 has traceability markings A2, CC, 56 clearly readable for a person wishing to investigate the quality of the lid 4 and/or the marked tab 2.

Fig. 6 shows a portion of the strip 1 after the laser engraving operation, and before the tab forming unit 11. The strip portion shown in Fig. 6 basically corresponds to the position marked VI in Fig. 1. The laser unit 9 has engraved the top markings WIN, A, 98 on the top surface of the strip 1. The approximate periphery of the tab to be produced in the following tab forming steps in the unit 11 has been indicated with ghost lines in Fig. 6.

The laser unit 9 comprises a high-power and high-speed laser capable of providing about 1 µm deep engravings in the tab surface. This is illustrated by downwardly directed arrows from the laser unit 9 in Fig. 2, corresponding to laser beams. Excellent results have been achieved in practice by a diode pumped laser of the type Dyna Mark T2 marketed by the German company Jenoptik. The requirements on the laser are high in the sense that the laser engraved marks must be provided in an extremely short time due to the high feeding rate of the strip 1. The laser also has to be very accurate, since the tab surface available for the markings is very small.

As shown in Fig. 4, the markings are laser engraved on the tab surface between the opening 5 and the inwardly bent edge portions 2a, 2b and 2c provided by bending means (not shown) included in the tab forming unit 11. The laser must be controlled very accurately by means of the control unit 14 in order to provide distinct laser engraved markings on this small surface of the tab 2. The positioning control is important. Since there is a continuous aim to reduce the strip material used, the width of the tab 2 should be as small as possible, thus leaving only a limited surface for markings. By the high-power

laser engraving according to the invention, distinct and indicative markings are provided on the tab 2 in spite of the small tab surface available.

In practice, the size of the laser engraved marks is about 2.5 x 2.5 mm, which makes them easily readable.

The laser unit 9 is disconnectible, which makes it possible to use the apparatus as a standard production line as well, even temporarily. If markings are desired on both sides of the tab 2, the laser unit 9 comprises laser means on both sides of the strip 1 (not shown).

In one aspect of the invention, use is made of laser in the production of opening tabs 2 to be attached to shells 3 for forming can lids 4, whereby the laser provides engravings on a metal strip 1 from which the tabs 2 are formed. The use of the laser must be carefully controlled in order to obtain the laser engravings exactly where needed on the strip 1 so as to obtain the markings exactly on the intended surface of the tab 2, at high production rate.

Finally, it should be emphasised that the invention by no means is restricted to the embodiments described in the foregoing, and modifications are feasible within the scope of the appended claims. In particular, it should be pointed out that the specific design of the can lid is not crucial as long as the aimed-at laser engraved markings are provided on the tab to be attached thereto.

CLAIMS

1. A method of manufacturing opening tabs (2) to be attached to lids (4) for cans, in which method a metal strip (1) having an upper surface and a lower surface is fed to a tab forming unit (11), in which it is punched and stamped to form the tabs (2) integrated with the strip (1), c h a r a c t e r i s e d in that the strip (1), before the tab forming operations, is provided with laser engravings on at least one of said upper and lower surfaces of the strip (1), said laser engravings forming marks (A2, CC, 56; WIN, A, 98) on at least one surface of the tabs (2).

2. A method as claimed in claim 1, wherein the peripheral edge portions (2a, 2b, 2c) of each tab (2) are bent inwardly and an opening (5) is cut in the tab, the laser engraving operation being adjusted in such way that the laser engraved marks are provided on a tab surface between the opening and the bent edge portions of the tab.

3. An apparatus for manufacturing opening tabs (2) to be attached to lids (4) for cans, comprising:

- a supply (8) of a metal strip (1) having an upper surface and a lower surface;
- a tab forming unit (11) including means for punching and stamping the strip to form the tabs (2) integrated with the strip (1); and
- means for feeding the strip (1) from the supply (8) to the tab forming unit (11);

c h a r a c t e r i s e d by

- a laser unit (9) arranged between the metal strip supply (8) and the tab forming unit (11), the laser unit (9) being adapted to provide laser engravings on at least one of said upper and lower surfaces of the strip (1), said laser engravings forming marks (A2, CC, 56; WIN, A, 98) on at least one surface of the tabs (2).

4. An apparatus as claimed in claim 3, wherein the tab forming unit (11) has means for bending the peripheral edge portions (2a, 2b, 2c) of each tab (2) inwardly, and means for cutting an opening (5) in the tab, the laser unit (9) being adjustable in such way that the laser engraved marks are provided on a tab surface between the opening and the bent edge portions of the tab.

5. An apparatus as claimed in claim 3 or 4, wherein the laser unit (9) comprises a high-power and high-speed laser capable of providing about 1 µm deep engravings in the tab surface.

6. An apparatus as claimed in claim 3, 4 or 5, wherein the laser unit (9) operation is disconnectible for allowing tab manufacturing without marking of the strip (1).

7. An opening tab to be fastened on lids for cans, c h a r a c t e r i s e d in that it has laser engraved marks (A2, CC, 56; WIN, A, 98) on its top or bottom surface, or on both these surfaces.

8. An opening tab as claimed in claim 7, comprising inwardly bent peripheral edge portions (2a, 2b, 2c) and an opening (5), the laser engraved marks being provided on a tab surface between the opening and the edge portions of the tab.

9. A can lid, c h a r a c t e r i s e d in that it has an opening tab (2) as claimed in claim 7 or 8.

10. Use of laser for providing markings (A2, CC, 56; WIN, A, 98) in the shape of laser engravings on opening tabs (2) for can lids (4), especially for beverage cans.

10

ABSTRACT

In a method of manufacturing opening tabs to be attached to lids for cans, a metal strip (1) is fed to a tab forming unit (11), in which it is punched and stamped to form the tabs integrated with the strip (1). Before the tab forming operations, the strip (1) is provided with laser engravings on at least one of its upper and lower surfaces. The laser engravings form indicative marks on the tabs.

In addition to the tab forming unit (11), an apparatus for manufacturing such tabs has a metal strip supply (8), means (12, 13) for feeding the strip (1) and a laser unit (9) for providing the indicative laser engraved marks on the tab.

Fig. 2 elected for publication

FIG.1
PRIOR ART

FIG.2

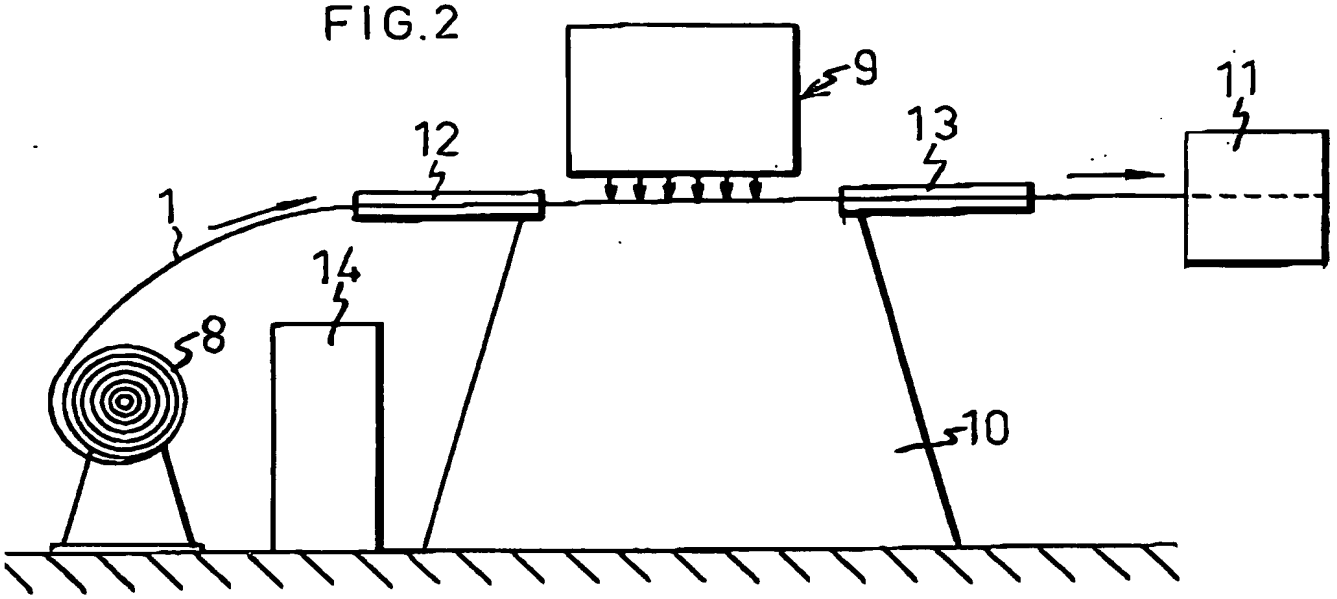

FIG.3

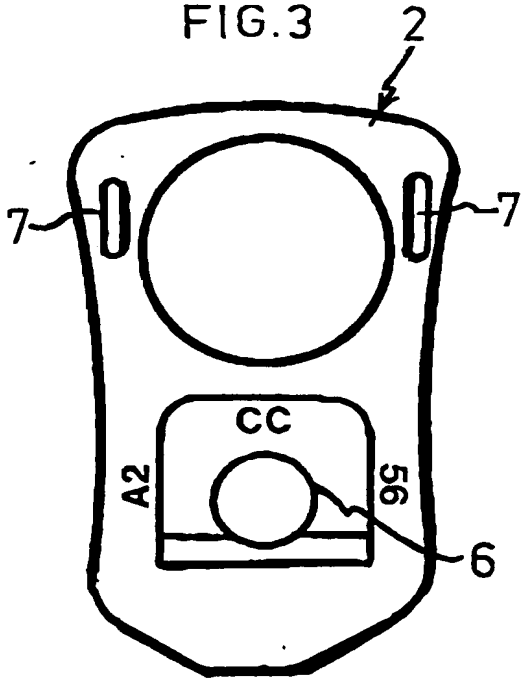

FIG.4

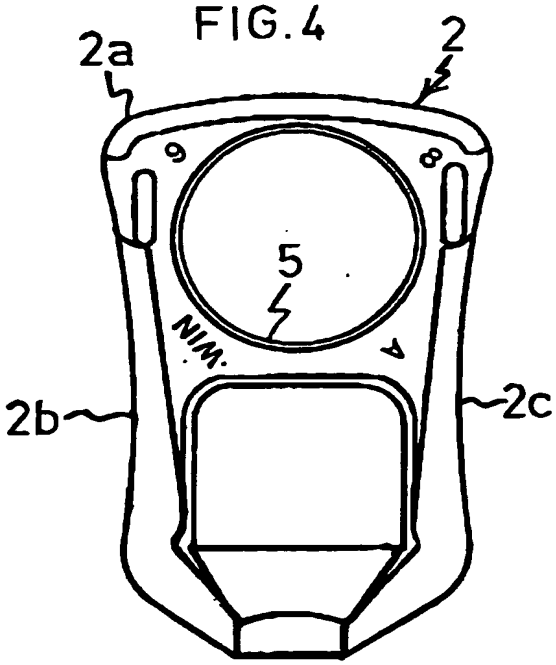

FIG.5

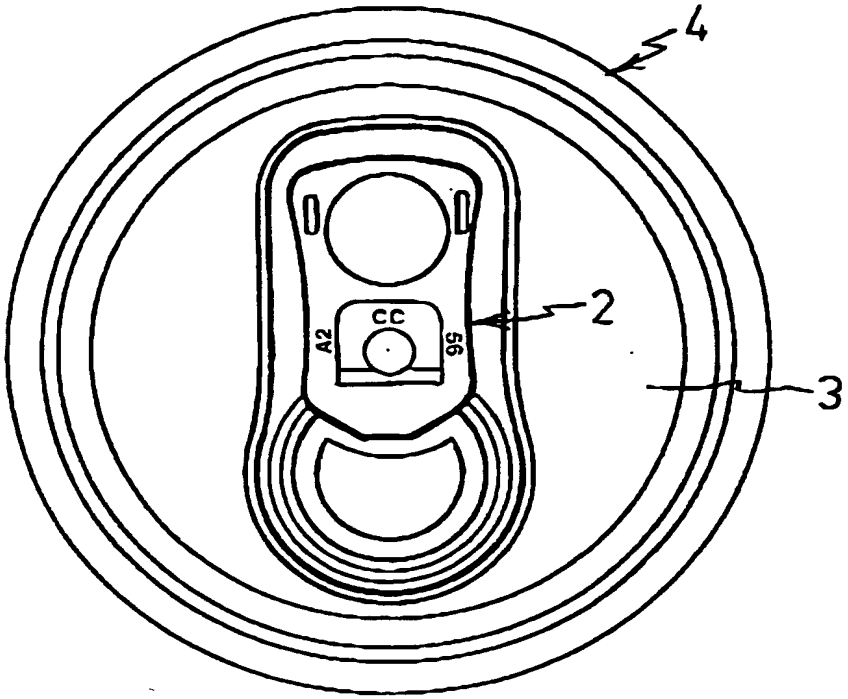

FIG.6